

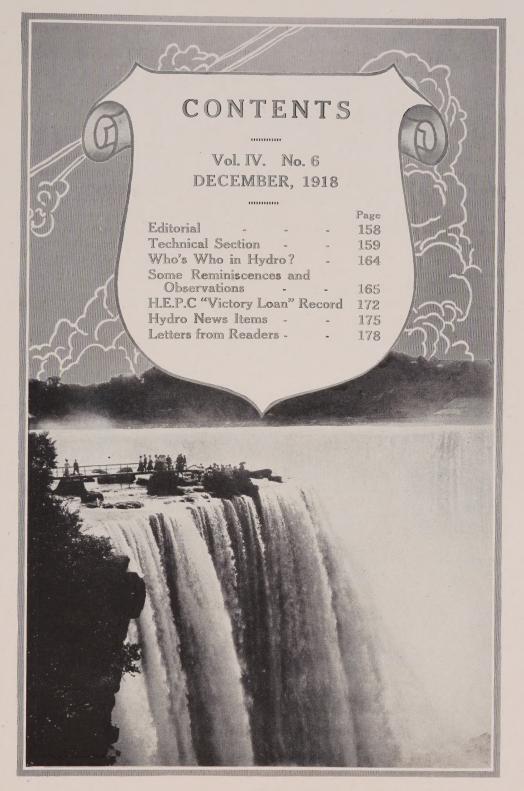
## BULLETIN

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## EDITORIAL

#### Merry Christmas!

HE Commission takes this opportunity to extend a hearty Christmas greeting to all municipal managers and officials.

After the long years of self-denial and wartime pressure, the cessation of hostilities is indeed a welcome Christmas offering.

## Wanted—Articles from Managers

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F late THE BULLETIN has not been getting its accustomed share of material from the field. We are in need of some good articles

for the Technical Section, and, of

course, will be only too glad to get contributions for other departments as well.

THE BULLETIN is of value to our readers in that it serves as a medium for the ready interchange of ideas, news and suggestions. We are confident that you all like THE BULLETIN—and we sincerely hope that you find it helpful. But please remember that our efforts and their effectiveness are altogether dependent upon YOUR ACTIVE SUPPORT AND CO-OPERATION.

Whenever you come across anything which you think would interest our readers, mail it to the Editor. If you are too busy to write an article for publication under your signature, just give us an outline of what you have in mind.

This appeal is directed to YOU—not the other man!





#### The Demand-Meter Situation

Critical Discussion of Demand-Meters, Pointing Out the Advantages
That Are Gained Through the Use of Well-Known Types of
These Instruments and Remedies for Some of the Troubles
Encountered in Their Practical Application

By C. F. MATHES

Meter Foreman of the Trinidad (Col.) Electric Transmission, Railway & Gas Company



STRUMENT manufacturers have devoted considerable time to the perfection of demand meters and have accom-

plished admirable results, but there still remains the necessity of reducing the attention required, assuring long-sustained accuracy, making the instruments adaptable to various services and reducing the first cost. Obtaining these factors devolves partly upon the manufacturers and partly upon the users, because even with the best-made equipment satisfactory results cannot always be obtained unless the apparatus is properly applied, installed and maintained

For this reason the writer will point out the classes of service to which several well-known types of demand meters are particularly suitable and then outline some troubles which have been experienced with each. In view of the fact that the advantages of each type are passed over rather briefly and more space is devoted to troubles, the writer wishes to warn readers against forming the impression that the demand meters on the market have nothing but disadvantages. Instead, it is hoped that the experiences which are related here may suggest improvements to manufacturers and help users perform their part in obtaining satisfactory operating results.

The advantage of an indicating meter, such as the Westinghouse type RO, lies in the fact that a combined watt-hour meter and demand meter are combined in one case and the demand-meter element requires no extra connections, contact device or paper charts. This instrument, moreover, is not so expensive as other types or combinations of instruments and is easily installed, owing to its compactness and to its not requiring extra connections. The maintenance of this instrument is negligible, as the indicating demand hand can be read and reset at the regular reading period. Owing to reasonable first cost and there being no extra maintenance features to speak of, this is an excellent meter for small installations where the revenue derived does not warrant the use of the more elaborate equipment suitable for larger installations.

## Importance of Time at Which Peak Occurs

Considering installations of moderate or large size, however, a type RO or similar instrument will hardly answer the purpose of defining a consumer's demand charge. Such installations generally require knowledge of the time at which their peak load occurs and just how much of a peak is attained at that time. The writer has attempted to use an ordinary indicating type of demand meter on just such installations, with the result that at some time or other the consumer will complain about his high demand charges. In such cases the watthour meter and demand-meter element would be checked for correctness. After this, what conclusive argument could be presented to the consumer? It could be said that the demand meter was correct, and evidently the high demand in question occurred at some time or other during the time elapsed between meter readings.

### Curve-Drawing Meters and Their Characteristics

In such cases, where the consumer and central station desire to know the exact time as well as the amount of peak demand, the only recourse is to install a curve-drawing wattmeter or a curve-drawing demand meter, such as a General Electric type G-2. Now, unless the installation is large enough to warrant the expense of a curve-drawing wattmeter with the necessary instrument transformers as permanent equipment, it may not be desirable to use this type of instrument, as first cost is considerable, and owing to the necessity of changing charts, winding the clock, refilling the pen and frequently checking the accuracy of the element, the cost and maintenance of such an instrument may be too great to warrant its use on small installations. When a central-station company gets several of these instruments on its lines over a widely scattered territory, the general result is that it takes all of one man's time to look after them. as the nature of each load has to be studied to get the proper speed for the paper feed, and the instrument must be kept in proper time and otherwise maintained.

With the Westinghouse types of graphic wattmeters, having selfwinding clocks, the writer has had considerable trouble in keeping the clocks going. The clocks do not seem to have strength enough to carry the proper re-roll attachments, and it has not been found advisable in most cases to attempt to use the re-roll attachment but to catch the used paper in a basket or other receptacle set under the instrument. Trouble has also arisen because of the failure of contacts to release after the cam has traveled past the point where they should release. In such cases the motor will wind the spring to such a tension that the spring will break from its fastenings on the shaft.

## Solutions of Difficulties with G-2 Meters

Regarding the General Electric type G-2, the writer is glad to note the departure from the pen-and-ink system used on other instruments. The specially prepared chart, however, has given trouble in other respects. On certain outdoor substations it has been noted that in zero weather the stylus will not make a line on the chart, and then again on installations where the meter is liable to have the sun strike it the charts will turn purple all over. This makes it impossible to read any lines that may have been made by the stylus. In places where the meter is subjected to extremely low temperatures the writer has found it practicable to install several carbon lamps in the meter house to provide a little heat. A homemade thermostat installed to regulate the heat in the instrument itself has also been seen elsewhere. This heat in the instrument was provided by two 10-watt lamps mounted on a wooden block in the instrument case between the clock mechanism and the outer case. The latter scheme provided heat behind the chart, as it was found that one of the two lamps could be mounted almost behind the stylus and one slightly to the right of the terminal block in the lower part of the instrument, the burning of both lamps being regulated by the thermostat. On installations where it was possible for the sun to spoil charts it was found advisable to take an old chart and paste it on the inside of the glass cover of the instrument.

The disadvantages of this type of meter, other than those already outlined, are that the clock has to be wound and the chart changed once each week, a procedure which is almost identical with the maintenance features of the curve-drawing wattmeter types. For instruments installed at distant points from the meter department headquarters the writer endeavored to have switchboard attendants, electricians or others change charts and wind clocks on these meters, but succeeded in getting only fair results. It was found that charts would be left on from eight to ten days and the clocks allowed to run down; also, the charts would be put on carelessly and the stylus arm handled improperly, thereby throwing the instrument out of calibration. The stylus would be started from a point below zero, and in many cases the stylus would start at a time interval from the knurled nut that the chart in position. Conditions of this kind made it impossible to obtain a true demand on certain installations; so the writer found it safer, though more expensive, to have a company meterman take care of the instruments entirely.

On several meters it was found that the stylus arm would not return to zero at the end of one time interval and would continue on the second time interval on the same line. In some cases the stylus would go over the top of the chart and stick there until it was discovered on the next visit of the meterman. In other cases the double time interval would not reach the top of the chart and the stylus would be reset at the end of the second interval. In cases of this kind it was often hard to decide whether the line was a legitimate demand peak or a double interval. The cause for this double interval was found to be in the slide gearing arrangement. A little oil applied to the gear shaft and the working of the gear on the shaft has about eliminated this trouble. With the early types it was necessary to remove the entire face plate of the meter to get to the sliding gear and it's shaft. In the later types a round hole has been provided in the face plate, so it is possible to inspect the gear and shaft without removing the face plate.

Trouble with the contact-making mechanism for these meters was also encountered. Cams were found upon which the brushes had worn round grooves in the sharp points of the compound cams, thereby allowing the brushes to make continuous contact when the condition

of the cam became bad. In this matter the writer is now experimenting with a fiber cam, with good results so far. Regarding meters that had two-point and three-point cams it was found rather difficult to calibrate the meters on light load. This was partly due to the unequalized friction. To overcome this difficulty it was found practicable to take enough disk revolutions on the light-load check to allow the cam to make two complete revolutions. After taking several checks at light load in this manner, good accuracy could be attained. On the more recently purchased contact devices it was found advisable to have cams with ten or fifteen points to equalize the friction on light loads better.

It is interesting to note, from several experiments, that the type RO meter will invariably show a higher demand when installed on the same load as a type G-2. This is evidently due to the different principles upon which the two meters operate and the inability to keep them in step in regard to the time intervals.

The General Electric type M line of demand meters have similar drawbacks to the RO type, inasmuch as they are only suited to small installations where a demand indication is seldom or never questioned. Aside from this, they require a contact device installed on a regular watt-hour meter, extra wiring, and, unless the scale is calibrated for the particular installation, an odd constant is derived, which also holds true for the G-2 meter.

## Critical Discussion of the Type RA Meter

The Westinghouse type RA meter, only recently put on the market, has not received much comment as yet, and it is probable that a number of companies have not experimented with it. The combination of a watt-hour and a demand meter in the same case. similar to the RO type, is a good feature, although the pen, ink, paper and clock nuisance is still manifest. The extra work seems to be put on the watt-hour meter register in the shape of additional gearing and pen arm. It is another type of meter in which the writer believes trouble will arise on light-load calibration should the register accumulate any friction from dirt, and dirt is bound to get into the instrument because of the continual removal of the cover to wind the clock springs and for changing of charts. The location of meters is not always the cleanest place in the world, and the cover of the type RA meter, which is only sheet metal, does not fit very well. The tendency seems to be for the sides, top and bottom to bulge out, which leaves openings for dust to get in. The stiffer cover of the RO type seems far superior to the sheet-metal cover of the RA type, which is presumably used to reduce weight. The clock, having

a very high-grade watch type of escapement, would also be sensitive to this accumulating dust. It seems that the escapement should be protected by a covering of some kind.

The mechanical construction on the Esterline types of graphic meters seems to be an improvement in this respect. The entire clock mechanism is inclosed and is about as free from the accumulation of dust as it practicable to make a clock mechanism for curve-drawing instruments. The clearance for the paper charts between the metal framework supporting the spools seems to be very small, and a very close adjustment of paper is necessary in order to assure its proper travel. Should the paper become out of alignment only slightly, the chart will not travel. It is also an instrument that would hardly allow handling by other than company employees, as it is necessary to remove the cover each time the clock requires winding or charts are to be changed or any adjustments made. Should other than company employees work on the meters, it would not be possible to seal them, and unscrupulous persons would have the watt-hour meter adjustments, which really govern the action of the demand element, available for tampering-Electrical World.



## Who's Who in Hydro?



BIOGRAPHICAL sketch of one's self written by one's self must of necessity contain a preponderant use of the personal

pronoun "I".

My good English mother always taught me that the use of

the personal pronoun savored of egotism, but how can one relate personal experiences without its use, so here goes:—

1. It was born on a farm some years ago. Accurate information as to the date would be of little interest to the general public.

2. The farm is located on the old Talbot Road about three miles east of the City of St. Thomas.

3. From other members of the family I have

gathered the following information concerning my early history.

At the age of one—Fell out of bed and broke my nose.

At two years of age—Fell in the cistern; rescued without injury.

At three years of age—Fell out of the hay mow; broke my collar bone.

At four years of age—Fell from the harvest apple tree and broke nose.

At five years—Fell off the grey horse's back; nose broken again, this being the third time. It also apparently broke the charm, but

nose has been slightly crooked ever since.

At six years—was presented with a pair of boots with red tops and copper toes—was very proud of them.

At six years and one day—walked into a bonfire and ruined the aforesaid boots. Their loss is a source of regret to this day.

Attended a country school until about thirteen years of age, at which time came to the conclusion that father and mother knew absolutely nothing about what a boy needed in the way of an education (permit me right here to interject that in the light of a riper experience, my views have undergone a

radical change). Went to Missouri some years ago. Worked for a railroad contractor as paymaster, and subsequently as bookkeeper in a large

wholesale house. Returned to Canada, accepted a position as accountant with a local insurance company, which subsequently sold out to a large New York company. When the officials of the latter, from the president to the janitor had been safely landed in jail, I accepted a position as secretary-treasurer with a local department store. In 1911 when Hydro was introduced in St. Thomas, was appointed accountant for the Municipal Light, Heat & Power Department, and in 1912, was made general manager.



E. H. CAUGHELL

### Some Reminiscences and Observations

By H. F. STRICKLAND

Chief Electrical Inspector



URING the last fifteen years I have had funny experiences, but the lot of the Chief Electrical Inspector is not always a farce-

comedy, it often resolving into a heavy tragedy and at times a melodrama. Unlike the constructing engineer who has the satisfaction of seeing his works and productions admired, inspectors are always more or less on the destructive side of the fence, and are frequently regarded as trouble makers, kickers and as people who don't know anything.

With regard to funny experiences I have had many, but at the time of writing can only recall one or two which impressed me at the time as not only very amusing but decidedly significant, in fact impressive to a degree. In connection with the incident I am about to relate I was at the time Chief Inspector for the Fire Underwriters' Association and was immediately regarded by the proprietor of the institution which I visited as an emissary from the warm climate who had come to cause trouble and annoyance and show authority and superior knowledge. When I say superior knowledge, this is in comparison with the firm's local engineer, handy man and general mechanic. These latter gentlemen are the only people I have ever encountered who know more than

engineers, in fact to them an engineer is a kid-glove gent who knows nothing, and as for the wiring in a factory or building under the care of one of these caretakerengineer-mechanics, all others faded into insignificance. In those days they were the men who did the firm's wiring, repaired their motors and were regarded as the final authority on all matters pertaining to this class of work. On the other hand the electrical inspector was an interloper and one who butted in on the sacred precincts of the engineer's sanctum sanctori and dared to criticize or find fault with anything this potentate had undertaken to install or repair.

In the case now referred to, I had gone over a certain factory and had been permitted to accompany the firm's electrician through the premises, to whom I of course showed marked deference and respect, and after having ventured to suggest that some of the wiring was not in accordance with the Wiring Regulations I was ushered into the general manager's office where I was politely told by the engineer that what I wanted done was all "bunk". The manager finally concluded with the remark that he would have to give the matter his consideration and advise me later. Of course the criticisms I offered were entirely puerile, or considered so by a man of such superior knowledge as the gentleman I refer to,

mere trifles, some of them being only a matter of some 500-volt D.C. power wires lying hard on gas pipes and not empty pipes but filled with gas and in constant use, and these pipes were furthermore hung loosely under a wooden ceiling. There was not a properly fused circuit in the building and branch circuits were heavily overloaded from one hundred to one thousand per cent. To make a long story short and as the firm carried a considerable volume of insurance I was placed in the position of not wishing to cause them to cancel their insurance, thereby incurring the wrath of the insurance company; on the other hand I did not wish the place to burn down and on this account also incur the wrath of the insurance company for not having thus cancelled the insurance. I found by calling on the owner of the premises that he was a past-master in the art of jollying and he intended to do nothing until he had to, so with that conclusion I returned to the office and immediately had the rate increased to such an extent that he would either have to fix the wiring or pay a surcharge which would quickly bring him to his senses.

Without in any way admitting that he was wrong he then instructed a good firm of local wiremen to rewire the whole factory and I was then notified that the place was ready for re-inspection. After having gone over the entire premises and having found the work first-class I immediately looked up my genial friend the general manager and upon entering his office I found

the only defect which had not been remedied was one long drop cord which hung over the desk. This office was similar to many other offices in large manufacturing concerns in those days, inasmuch as dust, rubbish and wooden partitions were very much in evidence. This long drop cord had some four or five coils of slack between the ceiling and the socket and by the condition of the insulation on the cord it was evident that it had on many occasions fondly embraced some nails and other metal supports to which it had been attached, as the bare copper was exposed to view at many points. Just why this one drop light should have been overlooked was something I never quite understood; however, being in a secluded corner of the building somehow or another the contractor had overlooked it. The mains which supplied the installation consisted of three No. 6 conductors running through from the front of the building, along the ceiling of this office and were attached to a 110-220 volt, three wire distributions. The main cutouts protecting these wires were 50 ampere. The drop light over the manager's desk was tapped direct to the two outers of these mains, not even a fuse rosette or any protection whatever between the socket and the 50-ampere main fuses. I suppose we must have stood at least five minutes discussing the question of this cord. during which period the manager said he didn't see any harm in it as it had been there for at least five years and surely in that time something would have gone wrong.

and anyway his engineer had put it in. During this five minutes of conversation the manager kept running his fingers over the cord and twisting it around his hand and otherwise fondling it as if it was one of his best friends with whom he was about to part company. Never did I offer such a deep and sincere prayer that a cord would short-circuit and thereby demonstrate with more eloquence than words that what I had been endeavoring to explain was not a pipe dream and not only a possibility but a reality. I seemed to have an intuitive knowledge of what was coming and all of a sudden there was a flash-a puff of smoke and something like a miniature sky-rocket shot up from the manager's hand to a point on the ceiling, leaving a big black smudge where the last vestige of the flexible cord burnt off where it was attached to the No. 6 mains.

Almost as quickly as it could be told, this demonstration was followed by a shower of burning fluff, specks of burnt copper and other meteoric display from the ceiling. When peace was restored we looked at each other for probably four seconds with mute astonishment, especially on the face of the general manager, and finally the silence was broken by that gentleman turning to me and exclaiming only the following words-"Well. I'll be damned!" This little incident concluded with a short conference between His Nibbs, his engineer and the writer and I left him satisfied that at least once the inspector was right.

In the olden days, before the Commission instituted a real inspection system which not only embraces modern rules and regulations but does not permit every Tom, Dick and Harry to undertake electrical work without a permit, it was often the joy of the youth of the family, or what might be termed the electrical genius, to undertake to wire papa's house. The first step in electrical wiring was to install an electric bell. and when this demonstration of his skill was completed the genius was then promoted to the position of family Edison, and electric wiring being somewhat of a novelty and more or less of a fascination in those days, the rising Edison was then permitted by his indulgent papa to undertake the wiring of the whole house. I could fill a whole book with descriptions of amateur installations of this kind but I will leave it to the imagination of the reader as to the kind of wiring we came across. One or two incidents however might be instructive as such methods have not yet been adopted in our Rules and Regulations and for time saving and the minimum of cost I think that probably some of these boys had solved the problem. I remember one house quite distinctly in which a novel method of wiring had been adopted. The house was built on the square plan and from the top to the bottom there was a clear space in one of the partitions. The house had at one time been heated with hot air but a hot water system had subsequently been installed leaving some hot air risers still in the par-

titions. It happened in this case that there were four lights, one above the other; in the cellar a bracket, in the parlor a bracket, a bracket in the bedroom above and a fourth in the attic. The manner which had been adopted by the son and heir was as follows:-Four small brass goose-neck brackets had been obtained, these brackets being provided with small solid brass wall plates and they were in turn screwed directly into the plaster wall with long wood screws. These screws were long enough to reach clear through the lath and plaster and finally into the metal of the hot air duct. One strand of the cord from the socket and the goose neck was attached to the wall plate and the other ran into the air duct and was connected to a single conductor running down to the basement. At a point in the basement where the air duct issued. I found that one side of the circuit was connected to the metal air duct which in turn fed each of the four brackets, the other wire being attached to the other side of the circuit. The service entered the window in the attic but the service switch, fuses and meter arrangement being a little too much for the rising genius, had been left for the electric light company to install. They evidently smelled the rat and had not made connection when I got there.

The method for the carrying of mains from this service equipment to the basement was also novel. The house was wired in four different circuits and in order to reach the basement with the four cir-

cuits in question the young gentleman had appropriated about twentyfive feet of discarded garden hose, into which he had drawn four lengths of No. 16 cotton-covered cord. The master of the establishment not being at home, I sought the mother of the boy and explained to her as plainly as possible and with much regret that we could not pass the wiring. The mother's expression very much resembled that of a pussy-cat when a dog gets too near a batch of kittens. She glared at me as though I was a monster who had failed to recognize the genius which had been displayed by her boy. I, however, managed to back successfully out of the house and ultimately the proprietor thereof considered it advisable to have the place properly wired by a reputable firm.

Nor was this the only case of its kind I have seen, but I think this is probably as choice a sample of what might be if there was no inspection, in fact what was when there was no inspection.

I remember on another occasion a gentleman being ushered into my office in a great state of excitement one morning to ask me if I knew anything about the inspector who had gone over his house wiring. After having assured him that I knew the gentleman, as he had been with us for some five years. He explained to me in a very confidential way that he (the owner of the house) did not think the inspector knew his business and he immediately began to impart to me some mysterious defects which had been discovered by his son.

Of course we have to listen to these stories as we wish to make sure that something has not slipped by the inspector, and this gentleman's tale was unfolded about as follows:—

"Do you know," he said, "that we are in great danger from lightning, in fact the servants are not safe in the kitchen, the way the wiring has been done in our house, and I cannot understand how your inspector could have missed it." Of course, with such alarming information I naturally inquired what appeared to be the trouble. In a most tragic manner he then described to me that his boy had found that someone had tied a wire on to the service in the basement and fastened it deliberately on to the water pipe close by. "Do you know," he said, "that my son says that should there be lightning in the neighborhood, that everyone who touched the kitchen tap would be killed instantly?" It took me some little time to explain to the excited gentleman that the wire, upon which he expressed so much apprehension was a ground on the secondary, placed there for the very purpose of preventing shock. However, he departed with some misgivings as it seemed utterly irrational that the statement of his son should not have produced the same profound excitement and mystery in the mind of the inspector as it did in his own.

Passing on to the tragic side of inspection, it always produces a feeling of regret when one is called to visit the scene of an electrocution. I have witnessed a number of these tragedies since I have been

with the Inspection Department and it is to be specially regretted when one learns that in nearly every instance the tragedy would have been prevented by a proper installation and maintenance. Before there were any Government regulations, such as those now administered by the Commission, it was a pathetic thing to witness a coroner's inquest at which many witnesses, expert and otherwise, were called upon to tell what they had seen, and hear the details of an accident which would have been prevented by the installation of a safety device involving an insignificant expenditure. I will touch upon two incidents which occurred since I have been with the Commission, which carry with them valuable object lessons. Some three years ago an employee was killed in a brewery in Ontario during the act of operating an ordinary threadblade knife switch controlling a three-phase motor. He was standing on the wet floor of the brewery and with a groan he dropped dead where he stood,—leaving the usual destitute wife and family.

Of course, there was the usual coroner's inquest and the scene of the accident being close at hand the whole bunch adjourned to the brewery in order that they might have the details explained by a fellow employee who witnessed the fatality. While they were thus assembled the second employee advanced to the switch and during a moment of carelessness he grasped the live blades in the same way and also dropped dead.

Not very long after the above accident, in a factory in Toronto a 500-volt switch of the same description was fastened to a wooden pillar. This switch controlled a three-phase circuit supplying an induction motor immediately above. Some repairs were necessary to the motor and a laborer was sent downstairs with a large warning card on which the words—"Danger -Hands Off" were printed. He was instructed to place this card on the switch and in doing so likewise came in contact with the open blades, and another family was thus bereaved.

I know of several incidents of this kind, all of which would have been prevented had the regulations of the Commission then been in force, as they are at the present time. Some people seem to think, however, that electric switches will not hurt anyone in their place as they all understand them, and at all events they have been there for many years and have done no harm. This point seems to be part of the melodrama of electrical inspection and a lamentable fact generally, as many people who are warned will retaliate that "it has been thus for many years and no one has been killed."

In conclusion I would refer briefly to two peculiar accidents which occurred as a result of open switches on services. Some years ago a well-known musical conductor in Toronto (since deceased) was presented by the choral society which he had conducted for many years with a beautiful gold-headed cane. He was also an organist by profession and upon entering the organ chamber

one day (if I remember correctly) to give a lesson to a pupil, he advanced toward the switch which controlled the organ motor. This switch was an ordinary two-blade, 500-volt switch (on direct current) and in order to operate the switch, it was necessary to reach in to a somewhat awkward location. The old gentleman in question was a very nervous man and made the remark to the pupil at the time-"Never touch that switch. I always like to be on the safe side." With that remark he took his cane and reached toward the switch with the gold handle. By some manner or other the gold handle got across the blades and you can imagine the rest. The gold handle cane was no more, the organ was set on fire and it was with considerable difficulty that it was not totally destroved.

The other case was one where the family of the house had been away for the entire summer, during which time their home had been completely wired throughout, the wiring terminating in the basement with one of the old-style meterboards. The family's Toronto agent or representative had been instructed to arrange everything with the electric light company so that when the family arrived late that night with the staff of servants it would be only necessary to turn on the switch to put the lighting into commission. Upon arriving at the house they found that the pressing of the wall switches did not have the desired effect and they communicated with the electric light company. The company responded

with the information that the only thing necessary would be to close the main switch in the basement and all would be well. The only person in the party who understood what a main switch was, happened to be the negro cook, who volunteered to proceed to the basement and perform the necessary operation. The cook in question was broader than she was long and could not,

without considerable difficulty, reach the switch. Her eye, however, lit upon a rake which was standing against the wall, so taking it in her hand she jammed the iron rake right across the three blades of the switch. This was all right until the switch closed—then bang! and what immediately followed can be left to the imagination of the readers.

Women and Ele	ectricity
When a woman is sulky and will not sp	
f she gets too excited	
f she talks too long	
If her way of thinking is not yours	
If she is willing to come half way	
If she will come all the way	
f she wants to go further	
If she would go still further	
If she wants to be an angel	
f you think she in unfaithful	
If she is unfaithful	
f she proves your fears are wrong	
If she goes up in the air	
If she wants chocolates	
If she sings wrong	
If she is in the country	
If she is a poor cook	
If she eats too much	
If she is wrong	
If she is wrong	
If she gossips too much	
If she fumes and sputters	
If she becomes upset	
—From W. R. Catton, Supt., Brantford	

## H.E.P.C. "Victory Loan" Record



common with all other public spirited institutions, the Hydro-Electric Power Commission of On-

tario took an active interest in the recent Victory Loan campaign.

At a meeting called by the Chief Engineer, thirteen captains were appointed to take charge of the canvass in the various departments, and the Commission approved a suggestion to finance all employees who were unable to purchase outright or on the five months' basis offered by the government, by offering to carry such purchases over a period of ten months, making monthly deductions through the pay rolls.

An objective was arrived at in the following manner:—10 per cent. of the annual pay roll of the Administration, Engineering, Purchasing, Railway, Library Office, Garage Office, Farms Operation, Electrical Inspection, Station Maintenance, and Line Maintenance Departments; 7 per cent. of the Station Operation, Ontario Power Company, and Garage and Machine Shop Rolls; and 1 per cent. of labor pay rolls including, Queenston Power Development, Line Construction, Con-

struction Department, and Farms pay roll.

The total objective amounted to \$151,900, an amount which at the time was considered hopeless, but so well did the staff and employees respond to the call that in the end a total of \$217,100 was obtained or practically 143 per cent. of the objective.

A bulletin was prepared and mounted in the lobby, on which the progress made by each team was shown in different colors day by day as well as the total progress made. This bulletin was the work of Mr. Awde, of the Railway Department, and contributed in no small way to the success of the campaign.

On account of some initial delay, some of the outside employees had already placed their subscriptions before the Commission's action was known to them, otherwise the field showing in some departments would have been much better.

The amounts secured by each Captain through pay roll deductions and bank subscriptions are shown in the following table, and the bulletin is reproduced herewith, although much of its attractiveness due to the color scheme, is necessarily lost in the halftone.



Captains	F	Pay Rolls		Banks	Outside
1	No.	Amount	No	. Amount	Amount
Mr. Pope	13	\$ 6,300.00	7	\$ .950.00	\$ 500.00
Mr. Acres		24,850.00	20	12,600.00	40,700.00
Mr. Pierdon	73	6,900.00	51	7,900.00	1,500.00
Mr. Don Carlos	173	20,300.00	73	17,450.00	
Mr. Brandon	26	3,900.00	15	4,850.00	
Mr. Latimer	34	3,650.00	3	700.00	
Mr. Trimble	26	6,700.00	13	5,850.00	12,700.00
Mr. Lang		1,350.00	12	2,650.00	
Mr. Jeffery		3,200.00	26	9,550.00	
Mr. Strickland		2,450.00	12	1,450.00	
Mr. Fairlie	16	2,650.00	5	1,450.00	
Mr. Salter	7	850.00	6	5,400.00	
Mr. Dobson	13	1,700.00	24	2,450.00	3,650.00
	583	\$84,800.00	267	\$73,250.00	\$59,050.00
SUMMARY					
Pay Rolls	583	\$84,800.00			
Banks		73,250.00			
Outside		59,050.00			
TOTAL		\$217,100.00			

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#### K. R. McClellan Dead

Readers of THE BULLETIN will learn with regret of the death of Mr. K. R. McClellan, which occurred on November 16th, at Swan River, Manitoba. Mr. McClellan was well known to the electrical fraternity in Ontario, having been connected with the Electric Power Company, Ltd., for several years before the absorbtion of that company by the Commission, in connection with the sale of power on the Central Ontario System.

On September 1st, ill health forced Mr. McClellan to resign his position with the Commission and, after spending some weeks with his parents at Powassan, Ontario, he went to Swan River, Manitoba, to look after some business interests. His health improved somewhat for a time but the improvement was only temporary, and, after a very short, acute illness, he passed away. Mr. McClellan was thirty-eight years of age and was born in Alton, Ontario. He leaves a widow and four children.

## MYDRO NEWS ITEMS

#### Rideau System

CARLETON PLACE—The municipality of Carleton Place has secured an option on the local plant owned by H. Brown & Sons which consists of a hydro-electric generating station and distribution system, for the sum of \$100,000. The municipality will vote on a Hydro enabling by-law and a money by-law at the coming January elections.

HIGH FALLS GENERATING STATIONS—Two of the hydro-electric units for the High Falls generating station, which were purchased from the Hannawa Falls Power Company, Potsdam, N.Y., have been delivered, and are at present stored at the plant. A third unit will be delivered early next spring. The combined capacity of the turbines will be 3600 h.p. The designs for this plant are completed and construction work has been commenced and will be carried on throughout the winter.

PERTH—The Perth-Smiths Falls transmission line has been completed and the Perth sub-station is well on towards completion. It is anticipated that the sub-station will be placed in operating condition and power turned on by Christmas.

PERTH-HIGH FALLS LINE—To date, 769 poles have been erected on this line by Foreman Bailey. It is anticipated that the erection of poles will be completed by Christmas. Wire is being strung by Foreman Mitchell, but this work will be postponed until next spring as soon as the heavy winter weather sets in.

RIDEAU POWER COMPANY—The Rideau Power Company has purchased an additional second-hand unit of 500 k.w. capacity and proposes to install this immediately in order to supply the additional loads being connected to the Rideau System.

SMITH FALLS—The municipality of Smiths Falls is now being supplied with Hydro power from the Rideau Power Company's plant at Merrickville. In addition to the Hydro power supplied from the above plant, the municipality also owns two hydro-electric plants to supply a portion of its load.

The Hydro-Electric Power Commission is at present arranging for the installation of two—1,000 Imperial-gallon, centrifugal pumps and one—800 Imperial gallon booster pump for the water-works system. These units are to be electrically driven by means of Hydro power.

#### St. Lawrence System

GENERAL—The transmission line between the Cornwall High Tension sub-station and the Municipality of Morrisburg has been completed and is ready for operation.

BROCKVILLE—The Commission is at present making an investigation and is reporting on the advisability of installing additional electrically driven water-works pumps for the municipality of Brockville. It is proposed to install one 600 Imperial gallon motor driven pump and one 900 Imperial gallon motor driven pump, also one 3,000 Imperial gallon centrifugal booster pump. In order to eliminate the use of steam, it is proposed to install two 10-inch three stage, 1,250 gallons per minute centrifugal pumps, direct connected to gasoline units of 185 h.p. running at 1,200 r.p.m. A complete report has been submitted to the municipality for their approval.

CORNWALL SUBSTATION—Work on the installation of the electrical apparatus at the Cornwall substation is progressing satisfactorily and should be completed by the middle of January. The work, however, will be delayed owing to the non-delivery of the high tension transformers, but it is expected that these transformers will be delivered and erected ready for operation by the middle of February.

TORONTO PAPER COMPANY, CORNWALL—The Toronto Paper Company, which has a large pulp and paper mill on the outskirts of the

municipality of Cornwall, has signed a contract with the Commission for the delivery of 300 h.p. It is anticipated that this load will increase very materially in the near future. The high tension line from the Cornwall sub-station to the Toronto Paper Company sub-station has been completed and it is expected that work on the substation will be started in the near future.

#### Prince Edward County

GENERAL—A44,000 volt high tension line is being erected from Trenton tap to Picton. Poles have been erected from Picton to Wellington and from Trenton to Hillier and wire has been strung from Trenton to Weller's Bay. It is expected that this line will be completed by the end of January.

BLOOMFIELD—The arrangements have been made for the construction of the distribution system for this municipality. The citizens are proposing to dig all the holes necessary, free of cost, and the Commission will complete the rest of the work, employing local labor very largely.

PICTON—The Commission has commenced the erection of an outdoor type sub-station for supplying the municipality of Picton. The brick building for this sub-station has already been completed and the erection of the electrical apparatus will be commenced in the near future. It is expected that power will be delivered to Picton sometime in February.

The Commission is at present arranging for the installation of electrically driven pumps for the Pictonwater-works system. Two 600-gallon per minute, 3-stage, 6-inch, centrifugal pumps will be installed and will be driven by two, 100 h.p. motors. Contracts have been let for this equipment and the work is progressing favorably.

WELLINGTON—The Commission is erecting an outdoor type substation for supplying Wellington and Bloomfield, transforming power from 44,000 to 4,000 volts for local distribution. Brick work on the substation has been completed and the erection of the electrical apparatus will be commenced in the near future.

The municipality of Wellington has purchased the local distribution system from the Nyles Seed Company. The above system is a direct-connected system and it is proposed to supply A.C. power to the municipality over this system temporarily until next spring when it is hoped that construction costs may be materially reduced.

#### Nipissing System

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GENERAL—The Commission is at present making investigations with reference to a supply of power to Trout Creek from the Nipissing System.

STORAGE DAM—The Commission has decided to postpone the

erection of a storage dam on the South River near Trout Creek until such time as labor and material costs have been reduced to something like normal.

## Street Lighting Schedules for 1919

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Each Hydro municipality was supplied during 1918 with a Street Lighting Schedule, giving the time for turning on and off street lamps for each day in the year. These schedules were made up for various districts, according to geographical location. The times given in the schedules were also such that they can be used from year to year without change, thus obviating the necessity of sending out new schedules each year.

Any municipality requiring an additional copy or any municipality not having received a schedule last year, can obtain same by sending a postal to the Hydro-Electric Power Commission at Toronto.

## Swiss Encourage Use of Hydro-Electric Power

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The Swiss Bundesrat has authorized the Department of Public Economy to make all reasonable arrangements to insure the greatest possible use of available hydro-electric energy as well as to create additional plants and harness water power wherever feasible.——Electrical Review.

## LETTERS FROM READERS

France,

Wednesday, Oct. 2nd, 1918. Dear Major Pope:

It seems a very long time since I had a letter from you. On two occasions letters have been sent to you, but no reply has come, so if you have written, your letters have been lost in transit.

The Hydro BULLETIN reaches regularly, and in August a copy of your Annual Report reached me, I took it along with me on my leave and its contents interested me greatly. You can be assured I appreciate your kindly interest greatly.

What wonderful strides you are making, yet, no doubt, you are greatly handicapped by the shortage of labor. It must be very gratifying to Sir Adam Beck, and in fact, to all who have added their bit in the vast undertaking, to see it such a success.

You will no doubt be greatly interested in the big things that our armies have been doing during the last few months, especially the part in which our own lads have played so prominent a part. If it were permissable I would like to tell you about it all, that is the part our Canadian Corps played in the battles before Amiens, Arras, and the crossing of and advance east of the Canal Du Nord, to tell you about it as we see it, not as the papers hand it out to you. However, if such things were attempted, the high and mighty Censor would have a noose about my neck in short order.

It is possible to say though, that August and September will go down as great and glorious months for our Corps, and its leader. So long as we have the man at our head that we have now we will continue on our certain well-defined way because everyone has absolute trust in him and in his ability and judgment. It has been my good fortune to have served under him as a brigade, divisional and army corps commander, and as a brigade commander I learned to know him best. My field commander worked always with his brigade. While he does not play any favorites, he yet has a warm spot in his heart for all originals who have played the game under him during all these weary months.

We have been on many a hard won field of battle, but of all, our most wonderful day was August 8th. Every man was on tip-toe, ready and waiting for the word to go. We had been held in leash for a long time, and while we were not fed on uncooked beef, etc., to make all ferocious, every man was hardened and fit for anything through hard training and athletics. When the flag dropped that day, our men went out to win, and win they did, for beside beating the Hun to a standstill, our lads penetrated further into the enemy's territory than had been done on the Western Front before. When the Hun learned who the men were

that were on his heels, he went so fast that a hare running alongside had no chance at all in the speed game. He left his guns behind, ready for action, with sights and breechlocks intact, and they were quickly turned around and used to good advantage in speeding him on his way. It was good sport shooting his dirty gas shells after him.

The great lumbering Tanks proved themselves that day. It was the first day that we ever used our horses in a fight. In came individual officers, apart from the cavalry, and we could cover a good deal of ground and so watch the Tanks play their game.

Our Engineers' work consisted mainly in the construction of bridges that the Hun had destroyed, the repair of and building of roads, water-supply systems, and the mean and dangerous work of searching for and destroying "booby-traps" which the Hun's brutal and unfair instincts make him an adept at secreting. These are fiendish and destructive snares. We find most of them, but I do not like the task.

Riding over the field, one could see and understand the little tragedy that had been staged in each small area. A group of Hun machine gunners more valient than others would attempt to hold up our sure and steady advances. If a hold-up became serious, a Tank would be signalled and in its own little convincing way would lumber over to the desired spot and soon put an end to any argument the Hun would have.

Since that day and the few follow-

ing it, we have had much more work to do, and each case the work we set out to do was accomplished on schedule time.

Here is a good story which will in a way illustrate the confidence that is put in our Corps. A noted commander of one of the best divisions in the British army had been buffeted about a good bit by the Hun in his mad rush for the sea and Paris. Each area this commander went to with his division, the Hun would attack, so that the Hun became a nightmare to him. He was finally sent up to the area in rear of our Corps, with the Guards on our left to have a rest. On arrival in his new area he made enquiries as to the troops that were in front of him. When informed of the situation, he exclaimed, "Here's good news, the Canadians are holding the line in front of us, and the Guards are on the left. Pyjamas to-night, eh what."

When a regiment marches by, everyone hurries out to see it. One day a regiment of ours was marching by a crowd of men from an English regiment. One man called out to another, "Come out and see the 'sojours," 'the other replied "Them's not 'sojours,' them's Canadians."

I had a very good leave between our big scraps and enjoyed it to the limit. Had been eleven months without any leave, and while in front of Amiens, I got a touch of dysentery. Lost eleven pounds in three or four days, so decided to have a rest. Spent most of my two weeks down in Devonshire, and had a very good rest indeed. During September I was as busy as could

be but things are easing up a bit just now. Was complimented on the work done with my unit during our last push. The Engineers were given a very big task to do and everything came off according to schedule.

The weather has turned quite cold and soon we must start in preparing for winter. It looks as if we might get back to Canada for Christmas 1919. The Hun is squealing and the Austrian is despondent, while Bulgaria is a quitter and the Turk is sick. It looks like the beginning of the end. We have been a very long time in striking our real stride but it looks as if we

were really in it at last. In it all Britain has been to the fore and we have every reason to be proud or Canada, and so thankful that we are part and parcel of the great Empire.

Will you please give to Mr. Gaby, my respects, also to H. G. Acres, A. V. Trimble, Pierdon, J. N. Stanley, Latimer and all the rest I know.

Major Harry Crerar is now at Corps Headquarters. He is a very smart and able artillery officer.

With kindest regards and best wishes for your good health, as ever.

> Yours sincerely, E. F. LYNN.

A. M. E. E. CONVENTION

January 30 and 31, 1919

The Winter Convention of the Association of Municipal Electrical Engineers will be held in Toronto on the above dates. Plans for this convention are progressing favorably and it promises to be as successful as that held at Niagara Falls last June.

The January BULLETIN will give further particulars concerning the place of meeting and the programme.

REMEMBER THE DATES!

# HYDRO MUNICIPALITIES

	. U	TATOTATOTT	1 M
NIAGARA SYSTE	M	Pop.	
25 Cycles	Pop.	Seaforth 9.075	
Acton	1,570	Simcoe 4,032	
Acton	462	Springfield	Alton.
Ayımer	2,119	St Catharines       17,917         St. George       600	Artem
AVI	780		Chatsy
Baden	710	St. Mary's	Chesle
Blenheim	-503 1,257	St. Mary's.       3,960         St. Thomas.       17,216         Stamford Township.       3,418	Dunda
Bolton	727	Stamford Township 3,418	Durha
BoltonBothwell	695		Elmwe
Brampton	4,023	Strathroy. 2,816 Streetsville. 500	Fleshe
Brantford Township	26,601	Streetsville	
Brantford Township	7,739 500	Tavistock	Hanov Holste
Breslau		Tavistock       974         Thamesford       504         Thamesville       742	Hornin
Briggen	400 700	Thorndale 250	Marko
Burford Burgessville	300	Tilbury	Mount
Caledonia	1,236	1 Illsonburg	Neusta
Chatham	13,943		Orang
ChathamClinton.	1,981	Toronto Township 5,008	Owen
	800		Shelbu
Dashwood	350	Walkerville. 5,349 Wallaceburg. 4,107	Tara
Delaware	350	Waterdown	
Dorchester	400 613	Waterford	
Drayton	1,403	Waterloo 5,091	
Drumbo	400	Waterloo Township 6,538	Ottawa
Dublin	218	wattord 1,115	
Dundas Dunnviile	4.834	Welland	PORT
Dunnviile	3,286	West Lorne	Port A
Dutton	840	Weston	
Elmira	2,065	Weston         2,283           Windsor         26,524           Woodbridge         615	CENT
Elora	$\frac{1,005}{472}$	Woodbridge	Bellevi
Emplo	502	WOODSLOCK	Bowm
Embro. Erin. Etobicoke Township	5,822	Wyoming 526	Bright
Exeter	1,504	Zurich	Cobou
Fergus	1,679	Total 1 011 070	Colbor
Forest	1.421	Total 1,011,978 SEVERN SYSTEM	Desero
	11,920	60 Cycles	Kingst
Georgetown	1,654	Alliston 1,237	Lindsa Madoo
Crantham Township	4,553 3,133	Barrie	Millbr
Granton	300	Beeton	Napan
Guelph	16 022	Beeton. 588 Bradford. 946	Newbu
Guelph	1,053	Coldwater 617	Newca
Hamilton	104.491	Collingwood 7,010	Omem
Harriston	1,563 717	Cookstown	Orono.
Hensall		Creemore         599           Elmvale         775           Midland         7,109           Orillia         7,448           Penetang         3,672           Port McNichol         500           Strumper         300	Oshaw Peterb
Hespeler	2,887 427	Midland 7,109	Port H
Highgate	5,300	Orillia	Stirling
Kitchener	19,380	Penetang	Trento
Lambeth	350	Port McNichol 500	Tweed
LambethListowel	2,291		Whitb
London	57,301	Thornton	
Lucan	643	Tottenham	
Lynden	662 1,947	Waubaushene 600	ST.
Milton	929	Transaction	
Mimico	2,004	Total 41,941	Brocky
Mimico	1,656	WASDELL'S SYSTEM	Cheste
Mount Brydges	500	60 Cycles	Prescot Willian
New Hamburg New Toronto Niagara Falls	1,398	Beaverton 821	Winche
New Toronto	1,423	Strechin   215   Cannington   746   Sunderland   570   Woodville   357	VV IIICII
Niagara Falls	11,715	Cannington	
NorwichOil Springs	1,093 537	Sunderland 570 Woodville 357	
Otterville	500	Woodvine	
Otterville	1,843	Total 2,709	Perth. Smith's
Palmerston	4,437	NIPISSING SYSTEM	Smith's
Petrolia	3,047	60 Cycles	
Plattsville	550	Callander 650	
Point Edward	937	Nipissing 400	ESS
Port Credit	1,176	North Bay 9,651	
Port Dalhousie	1,318 831	Powassan	Amhers
Preston	4,949	Total 11,273	Canard
Princeton	600	MUSKOKA SYSTEM	Cottan Essex.
Ridgetown	2,080	60 Cycles	Harrow
Ridgetown	650	Gravenhurst 1,600	Kingev
Rodney	626	Gravenhurst	Leamir
Sandwich	3,077		
Sarnia	12,323	Total 3,735	

EUGENIA SYSTE	IVI
60 Cycles	
Alton	Pop. 700
Artemesia Township	2,396
Arthur. Chatsworth Chesley Dundalk	1,003
Chatsworth	286
Chesley	1,860
Dundalk	750
Dundan	1,520
Flesherton	500
Grand Valley	428 586
Hanover	3,310
Holstein	285
Horning's Mills	350
Markdale	904
Mount Forest Neustadt	1,871 470
Neustadt	2,381
Owen Sound	11,819
Shelburne	1,018
Tara	620
m	
	33,057
OTTAWA SYSTEM	M
60 Cycles	
Ottawa	100,561
PORT ARTHUR S	YSTEM
60 Cycles	15 004
Port Arthur	15,224
CENTRAL ONTARIO S 60 Cycles	YSTEM
Relleville	12,080
Bowmanville	3.545
	1 978
Cobourg	4,457 811 2,061
Colborne	811
Deseronto	2,061
Kingston	22,265
Madoc	1,752
Millhrook	1,114
	746
Napanee	22,265 7,752 1,114 746 2,881
Napanee Newburgh	2,881
Brighton Cobourg Colborne Deseronto Kingston Lindsay Madoc Millbrook Napanee Newburgh Newcastle	2,881 444 600
Napanee	2,881 444 600 446
Napanee Newburgh Newcastle Omemee Orono	2,881 444 600 446 700
Omemee Orono Oshawa	2,881 444 600 446 700 8,812
Omemee Orono Oshawa	2,881 444 600 446 700 8,812 19,816
Omemee Orono Oshawa	2,881 444 600 446 700 8,812 19,816 4,486
Omemee Orono. Oshawa Peterboro Port Hope Stirling Trenton	2,881 444 600 446 700 8,812 19,816 4,486
Omemee Orono. Oshawa Peterboro Port Hope Stirling Trenton	2,881 444 600 446 700 8,812 19,816 4,486
Omemee Orono. Oshawa Peterboro Port Hope. Stirling Trenton.	2,881 444 600 446 700 8,812 19,816
Omemee Orono. Oshawa Peterboro Port Hope Stirling Trenton Tweed Whitby	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902
Omemee Orono. Oshawa Peterboro Port Hope Stirling Trenton Tweed Whitby Total	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902
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Omemee. Orono. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed Whitby  Total  ST. LAWRENCE SYS	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538
Omemee. Orono. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed Whitby  Total  ST. LAWRENCE SYS	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 104,538 TEM 9,473 868
Omemee. Orono. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed Whitby  Total  ST. LAWRENCE SYS	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630
Omemee. Orono. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed Whitby  Total  ST. LAWRENCE SYS	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 100
Omemee. Orono. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed Whitby  Total  ST. LAWRENCE SYS	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630
Omemee. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg. Winchester	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 <b>TEM</b> 9,473 868 2,630 1,042
Omemee. Orono Oshawa Peterboro. Port Hope. Stirling Trenton. Tweed. Whitby  Total  ST. LAWRENCE SYS Brockville. Chesterville. Prescott. Williamsburg Winchester  Total	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113
Omemee. Orono Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113
Omemee. Orono Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113
Omemee. Orono Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113
Omemee. Orono Oshawa Peterboro. Port Hope. Stirling Trenton. Tweed. Whitby  Total ST. LAWRENCE SYS 60 Cycles Brockville. Prescott. Williamsburg Winchester  Total RIDEAU SYSTEM 60 Cycles Perth Smith's Falls	2,881 444 600 446 700 8,812 19,816 4,486 4,486 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113
Omemee. Orono Orono Oshawa Peterboro Port Hope. Stirling Trenton. Tweed. Whitby  Total ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg Winchester  Total RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls.  Total	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,004 10,042 14,113 1 3,358 6,115 1 9,473
Omemee. Orono Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls.  Total	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,004 10,042 14,113 1 3,358 6,115 1 9,473
Omemee. Orono Orono Oshawa Peterboro Port Hope. Stirling Trenton. Tweed. Whitby  Total ST. LAWRENCE SYS 60 Cycles Brockville. Prescott. Williamsburg Winchester  Total RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls  Tota ESSEX COUNTY SYSTEM 60 Cycles	2,881 444 600 446 700 8,812 19,816 4,486 4,486 1,350 2,902 104,538 TEM 9,473 868 2,630 1,004 1,012 14,113 1 3,358 6,115 1 9,473 STEM
Omemee. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg Winchester  Total  RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls  Tota  ESSEX COUNTY SYS 60 Cycles Amherstburg	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,00 1,042 14,113 1 3,358 6,115 1 9,473 STEM
Omemee. Orono. Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls  Tota  ESSEX COUNTY SYS 60 Cycles Amherstburg. Canard River.	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113 1 3,358 6,115 1 9,473 STEM 1,990 100
Omemee. Orono. Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls  Tota  ESSEX COUNTY SYS 60 Cycles Amherstburg. Canard River.	2,881 444 600 446 700 8,812 19,816 4,486 4,486 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113 1 3,358 6,115 1 9,473 STEM 1,990 50 100 1,490
Omemee. Orono. Oshawa Peterboro. Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg. Winchester  Total  RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls  Tota  ESSEX COUNTY SYS 60 Cycles Amherstburg. Canard River.	2,881 444 600 446 700 8,812 19,816 4,486 4,486 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113 1 3,358 6,115 1 9,473 STEM 1,990 50 100 1,490
Omemee. Orono. Oshawa Peterboro Port Hope. Stirling Trenton Tweed. Whitby  Total  ST. LAWRENCE SYS 60 Cycles Brockville. Chesterville. Prescott. Williamsburg Winchester  Total  RIDEAU SYSTEM 60 Cycles Perth. Smith's Falls  Tota  ESSEX COUNTY SYS 60 Cycles Amherstburg	2,881 444 600 446 700 8,812 19,816 4,486 823 5,169 1,350 2,902 104,538 TEM 9,473 868 2,630 1,042 14,113 1 3,358 6,115 1 9,473 STEM 1,990 100

Total 9,181

6H€ aim of the Bulletin is to provide municipalities with a source of information regarding the activities of the Commission; to provide a medium through which matters of common interest may discussed, and promote a spirit of co-operation between Hydro Municipalities.